NOTES ON CLUPEOID FISHES.

BY HENRY W. FOWLER.

The clupeoid Isospondyli contained in the collection of the Academy of Natural Sciences of Philadelphia, unless stated otherwise, are listed in the present paper. As many of the localities are interesting records of distribution, all are given with the number of specimens examined. Several apparently new species are also described.

ELOPIDÆ.

Tarpon atlanticus (Valenciennes).

Florida 3. I examined 2 adults in the care of Mr. D. McCadden, not the property of the Academy, from Fort Meyer, Fla.

Megalops cyprinoides (Broussonet).

Apia, Samoa 3.

Elops saurus Linnæus.

Nantucket, Mass. 1; S. Carolina 1; W. Palm Beach, Fla. 1; E. coast U. S. 1; no data 1; Santo Domingo 1; Surinam 1; Jamaica ? 2; Rio Janeiro 1.

Elops hawaiensis Regan.

Honolulu, H. Is. 1. Formerly I confused this with *E. saurus*.

ALBULIDÆ.

Albula vulpes (Linnæus).

Santo Domingo 2; St. Martin's 2; Port Antonio, Jamaica 1.

Dixonina nemoptera Fowler.

(Proc. Acad. Nat. Sci. Phila., 1910, p. 651, fig. Santo Domingo.)

Type No. 1,597, A. N. S. P.

HIODONTIDÆ.

Hiodon alveoides (Rafinesque).

Beaver R. 1, Youghiogheny R. 2, Pa.; Battle Cr., upper Mo. R. 2; Creek Country, Ind. Ty. 2; St. Joseph, Mo. 1; Yellowstone R. 1; "N. Am." Bonaparte Coll. 8; L. Minnetonka (also skull of *Amiatus calvus*), Minn. 2.

Hiodon tergisus Le Sueur.

L. Erie 1; Erie, Pa. 1; Venice, O. 1.

CHIROCENTRIDÆ.

Chirocentrus dorab (Forskål).

Padang, Sumatra 3, of which 1 is now in Stanford University.

NOTOPTERIDÆ.

Notopterus chitala (Hamilton-Buchanan).

Dried skin without locality.

DUSSUMIERIIDÆ.

Stolephorus delicatulus (Bennett).

Bacon, Philippine Is. 7.

Dussumieria elopsoides Bleeker.

Padang, Sumatra 2, of which 1 is now in Stanford University.

Jenkinsia stolifera (Jordan and Gilbert).

Hailer's Rock, Fla. Keys 17; Culebra, Porto Rico 4.

Etrumeus microps (Schlegel).

Honolulu, Hawaiian Is. 6.

CLUPEIDÆ.

Clupea harengus Linnæus.

Eastport, Maine 1; Newport, R. I. 2; Corson's Inlet, N. J. 1; Sweden 1.

Clupea pallasii Valenciennes.

(*Clupea mirabilis* Girard, Proc. Acad. Nat. Sci. Phila., 1854, pp. 138, 154. San Francisco, Cal.
Spratelloides bryoporus Cope, Proc. Amer. Philos. Soc., 1873, p. 25. Sitka, Alaska.)

Nos. 1,319 and 1,320, A. N. S. P., cotypes of *C. mirabilis* Girard.

No. 1,211, A. N. S. P., type of *S. bryoporus* Cope, in bad preservation.

Clupanodon cœruleus (Girard).

(*Meletta cœrulea* Girard, l. c. San Francisco, Cal.)

Nos. 1,252 and 1,240 to 1,243, cotypes of *M. cœrulea* Girard.

Clupanodon brunnichii (Schneider).

Adriatic Sea 6; Italy 6 (all in Bonaparte Coll.).

Clupanodon phalerica Risso.

(*Clupea papalina* Bonaparte, Cat. Met. Pesc. Eur., 1846, p. 271. Adriatic. No description).

Nos. 1,263 to 1,267, A. N. S. P., cotypes of the nominal *C. papalina* Bonaparte.

Clupanodon neopilchardus (Steindachner).

Melbourne, Australia 5.

Clupanodon pseudohispanicus (Poey).

Rio Janeiro, Brazil 1.

Pomolobus chrysochloris Rafinesque.

Wabash R., Indiana 2; Hayden Expedition 1.

Pomolobus mediocris (Mitchill).

Cape Cod, Mass. 1; Newport, R. I. 1; Barnegat Pier 1, Seaside Park 1, Corson's Inlet 1, N. J.; Potomac R. 3.

Pomolobus pseudoharengus (Wilson).

Portland, Maine 1; Cape Cod 2, Wood's Hole, Mass. 1; Newport, R. I. 3; Jersey City 1, May's Landing 20, Cedar Swamp Creek 1, Delaware Bay 1, N. J.; Bristol 15, Holmesburg 5, Pa.

Pomolobus æstivalis (Mitchill).

Wood's Hole, Mass. 1; Jersey City 1, Beesley's Point ? 1, Sea Isle City 5, N. J.

Alosa sapidissima (Wilson).

Martha's Vineyard, Mass. 2; Noank, Conn. 1; Duck I. 21, Bordentown 1, Newbold's I. 35, Washington Park 1, N. J.; Dingman's Ferry 25, Bristol 7, Holmesburg 9, Falls of Schuylkill 1, Pa.; Ft. Delaware, Del. 8; Delaware R. ? 1; Potomac R. 13.

Alosa fallax (Lacépède).

Italy 11, in Bonaparte Coll.

Sardinella granigera Valenciennes.

Beirut, Syria 1.

Sardinella atricauda (Günther).

Tahiti 3.

Sardinella perforata (Cantor).

Bacon, Luzon I., Philippines 1.

Sardinella hypselosoma (Bleeker).

Padang, Sumatra 4, of which 1 is now in Stanford University.

Sardinella humeralis (Valenciennes).

Newport, R. I. 2; Marquesas Keys 27, Hailer's Rock 1, West Palm Beach 2, Fla.; New Providence, Bahama Is. 6; Santo Domingo 7; Boqueron 2, Hucares 2, Porto Rico; Port Antonio, Jamaica 2; St. Martin's 43, Santa Cruz 20, W. I.; Rio Janeiro, Brazil 1.

Sardinella sardina (Poey).

Hailer's Rock, Fla. Keys 2.

Sardinella macrophthalma (Ranzani).

New Providence, Bahama Is. 6; Port Antonio, Jamaica 3; St. Martin's 3, Santa Cruz 3, W. I.

Sardinella stolifera (Jordan and Gilbert).

Mazatlan, Mex. 47.

GUDUSIA subgen. nov.

Type *Clupanodon chapra* Hamilton-Buchanan.

Differs from the other subgenera included in *Sardinella* by its small scales, which are about 80 to 120 in a lateral series.

(*Gudusa*, the native name.)

Sardinella chapra (Hamilton-Buchanan).

Ganges R., India 6.

Opisthonema oglinum (Le Sueur).

Beesley's Point 4, Sea Isle City 3, N. J.; N. America 5 (in Bonaparte Coll.); Santo Domingo 3; Port Antonio, Jamaica 1; Hucares 1, San Juan 1, Porto Rico; Santa Cruz, W. I. 1; Rio Janeiro, Brazil 2.

Brevoortia tyrannus (Latrobe).

Waquoit 3, Nantucket 24, Wood's Hole 3, Mass.; Seaside Park 1, Atlantic City 1, Great Egg Harbor Bay 5, Beesley's Point 2, Corson's Inlet 1, Washington Park 1, N. J.; Ft. Delaware, Del. 6; Chestertown 1, Big Bohemia Creek 2, Patapsco R. 3, Potomac R. 1, Md.; Ft. Macon, N. C. 2; S. Carolina 3; N. America 1 (Bonaparte Coll.).

Brevoortia tyrannus patronus (Goode).

Mississippi Sound at New Orleans, La. 2; Grand Plains Bayou, Miss. 3.

Brevoortia tyrannus aurea (Agassiz).

One without data, probably from Brazil ?

Brevoortia tyrannus dorsalis (Valenciennes).

Gaboon R., W. Africa 2.

HERINGIA gen. nov.

Type *Clupea amazonica* Steindachner.

Body strongly compressed, with trenchant serrated abdomen formed by bony scutes. Head small, well compressed. Mouth small. No teeth. Mandible protruding. Maxillary broad. Cheek normal. Gill-rakers slender, numerous. Branchiostegals about 5. Scales large, narrowly imbricated, cycloid, edges entire. No lateral line. Dorsal moderate, inserted behind ventral base, and fin entirely before anal. Anal rays few. Caudal forked. Pectoral low, not reaching ventral. Ventral depressed less than half space to anal. Coloration silvery.

Small herrings resembling *Pellonula* Günther, but differing in the absence of teeth. Some species of *Pellonula* are also credited with having the dorsal inserted behind the ventral origin. Possibly *Pomolobus melanostomus* Eigenmann is a member of this genus ?

(Named for Dr. Constantine J. Hering, who collected fishes in Surinam many years ago, for the Academy.)

Heringia amazonica (Steindachner).

Surinam 14 (Hering).

Ilisha narragansetæ sp. nov. Fig. 1.

Head $3\frac{1}{2}$; depth 3; D. IV, 13, I; A. IV, 41, I; P. I, 15; V. I, 5; scales about 44 in lateral series to caudal base (squamation damaged) + 5 (according to pockets); about 14 scales (squamation injured) between dorsal and anal origins; predorsal scales 20 (according to pockets);

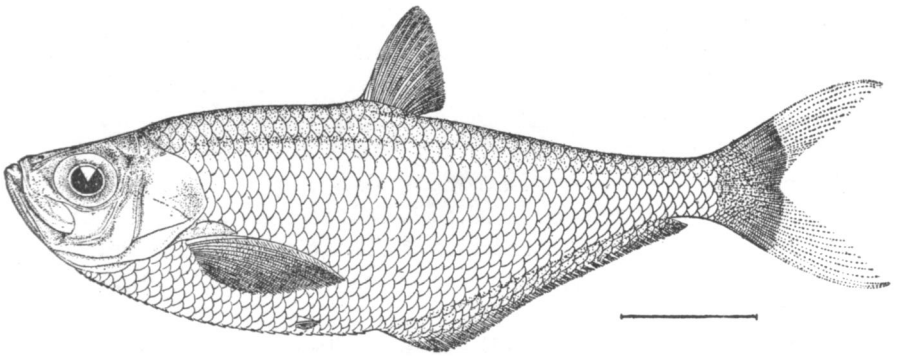

Fig. 1.—*Ilisha narragansetæ* Fowler. Type.

head width $2\frac{4}{5}$ its length; head depth at occiput $1\frac{1}{4}$; mandible $2\frac{1}{6}$; length of dorsal base 3; least depth of caudal peduncle $3\frac{2}{5}$; pectoral about $1\frac{2}{7}$; snout $4\frac{2}{7}$ in head measured from upper jaw tip; eye 3; maxillary $1\frac{9}{10}$; interorbital $6\frac{1}{4}$.

Body greatly compressed, thin, deepest at ventral origin, edges slightly trenchant, abdominal edge trenchant with 25 + 7 serræ, upper profile slightly convex and lower decidedly more so anteriorly, posteriorly lower straight. Caudal peduncle compressed, length trifle less than its least depth.

Head compressed, sides not especially flattened, but approximated below, upper profile little inclined, slightly concave, and convex lower greatly inclined. Snout surface convex, broad as long. Eye large, rounded, trifle before center in head. Apparently no adipose eyelid. Maxillary greatly inclined, reaches beyond front pupil edge till about

opposite first third in eye, its lower edge finely dentate and greatest expansion about half of eye. Mouth rather small, superior. Scarcely median emargination to upper jaw front. Mandible well protruded, rami well elevated inside mouth. A series of small premaxillary teeth, narrow, median largest and others graduated externally. Small similar series on each side of symphysis of mandible. A double series of minute teeth on each palatine longitudinally. Tongue narrow, depressed, surface above roughened medianly, pointed tip free. Nostrils small pores, together, about midway in snout. Interorbital constricted, slightly elevated, depressed. Preorbital width about half of eye, slipping over upper anterior portion of maxillary. Postero-infraorbital about half of eye. Preopercle ridge oblique, and hind edge slightly inclined forward. Opercles and cheeks smooth, striæ or lines inconspicuous or obsolete.

Gill-opening forward about opposite last fifth in snout. Rakers 12 + 22, compressed, pointed, 2 in eye. Filaments about $\frac{3}{4}$ of rakers. Pseudobranchiæ $2\frac{1}{4}$ in eye, much larger than filaments. Isthmus slender, swelling but slightly behind. No depression on shoulder-girdle.

Scales large, cycloid, each with as many as 6 vertical striæ, edges entire, disposed in longitudinal series, and of about uniform size. Dorsal and anal depressible within basal scaly sheaths composed of scales small in size. Caudal base covered with small scales. Free axillary scaly pointed pectoral flap $\frac{2}{5}$ of fin. An axillary ventral scale.

Dorsal inserted about midway between mandible tip and caudal base, graduated down from first branched ray which is longest (damaged), depressed fin $3\frac{1}{3}$ to caudal base. Anal inserted slightly behind dorsal or about midway between front eye edge and caudal base, first few branched rays little longest, others all short and fin low, base straight. Caudal (damaged) forked, lobes apparently pointed and equal. Pectoral falcate, rather broad, reaching far back as ventral tip. Ventral small, inserted much nearer anal than pectoral origin. Vent close before anal.

Color in alcohol brownish on back and upper surface of head behind, sides and lower regions silvery-white. Fins all pale brownish. Iris brassy.

Length $5\frac{7}{8}$ inches (caudal damaged).

Type No. 15,314, A. N. S. P. A single example from Newport, R. I. Samuel Powell.

Only the above example is known to me, and it would appear undoubtedly to have been obtained at Newport as a waif of the Gulf

Stream, probably from some tropical region in America ? It seems to be most closely related to *Pellona bleekeriana* Poey,[1] but according to the incomplete account of that species I am unable to consider them identical. Still further, I am obliged to allow them as separable, for Poey's account in some respects seems to strikingly disagree. Poey's fish was 100 mm. long and had the eye $3\frac{1}{2}$ in its head, while in my specimen, which is larger and consequently would be expected to have an equally small eye at least, it is 3 in its head. The greatest body depth in the total length of my example could not possibly be over $3\frac{3}{4}$ (even when its damaged caudal is allowed), while Poey alleges $5\frac{2}{3}$. According to Poey, the thickest part of the body is $\frac{2}{5}$ its greatest depth, while my example shows this clearly less than $\frac{1}{3}$. Poey says the maxillary reaches opposite the hind pupil edge, while in my example it does not even reach opposite the middle of the eye. Poey gives the teeth as somewhat long and curved, with a canine above and 2 below each side. My example shows no canines whatever. Poey says no teeth on the tongue, though my example shows it as asperous medianly. Poey gives the serratures as 25, while my example shows 32. Poey's example is said to have very caducous scales, while in mine they are largely adherent. Poey describes his fish as white, with a little pronounced silvery streak, which latter is not at all evident in my example. *Pristigaster flavipinnis* Valenciennes[2] differs in having much smaller scales, about 65. *Pellona castelnæana* Valenciennes,[3] which has been considered a synonym of the last, is too imperfectly described for positive identification. The occurrence of this fish, as far north as Rhode Island, is the most northern point at which any species of *Ilisha* has yet been found.

(Named for the country of the Narraganset Indians, now largely Rhode Island, where the type was secured.)

Ilisha hoeveni (Bleeker).

Padang, Sumatra 3, of which 1 now in Stanford University.

Ilisha brachysoma (Bleeker).

Padang, Sumatra 1.

Opisthopterus macrognathus (Bleeker).

Padang, Sumatra 1.

Odontognathus mucronatus Lacépède.

Surinam 2.

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[1] *Repert. Fis. Nat. Cuba*, II, 1866–68, p. 242. Matanzas.
[2] *Voy. Am. Mér. Orbig. Poiss.*, 1847, p. 8, Pl. 10, fig. 2. Buenos Aires.
[3] *Hist. Nat. Poiss.*, XX, 1847, p. 222. Mouth of the Amazon.

DOROSOMATIDÆ.

Dorosoma cepedianum (Le Sueur).

(*Chatœssus insociabilis* Abbott, Proc. Acad. Nat. Sci. Phila., 1860, p. 365. Trenton, N. J.)

Nos. 23,030 and 23,031, A. N. S. P., cotypes of *C. insociabilis* Abbott. Torresdale, Pa. 1; Potomac R. 1; Bayport, Fla. 3; Ohio ? 2; Wabash R., Indiana 1; Ft. Riley, Kansas 18; Davenport, Iowa 6; St. Joseph, Mo. 11.

Dorosoma cepedianum exile Jordan and Gilbert.

San Diego, Tex. 1.

Dorosoma petènensis (Günther).

Panama 1 (J. A. McNiel).

Signalosa mexicana (Günther).

Volusia, Fla. 1.

ENGRAULIDIDÆ.

Anchovia clupeoides (Swainson).

Santo Domingo 1; Rio Seco, Porto Rico 1. These both agree with Swainson's account, though likely *Stolephorus surinamensis* Bleeker may be different. *Engraulis productus* Poey is evidently a synonym of the present species.

ANCHOVIELLA subgen. nov.

Type *Engraulis perfasciatus* Poey.

This differs from the subgenus *Anchovia* Jordan and Evermann in the fewer gill-rakers, usually much less than 100 or about 35 to 50. Prof. E. C. Starks has kindly examined the gill-rakers of *Anchovia macrolepidota* (Kner and Steindachner), the typical species of *Anchovia*, and finds them about 106 + 135. *Anchoviella* includes the majority of species of *Anchovia*.

(*Anchoviella*, diminutive of *Anchovia*, as most of the species are of small size.)

Anchovia perfasciata (Poey).

Port Antonio, Jamaica 5; Aguadilla, Porto Rico 3.

Anchovia scitula sp. nov. Fig. 2.

Head $4\frac{1}{4}$; depth $6\frac{1}{3}$; D. III, 13; A. III, 16, I; P. I, 13; V. I, 6; scales about 40 in lateral series (counted by pockets) + 2 more on caudal base; about 9 scales (pockets) between dorsal origin and middle of belly; about 22 predorsal scales; head width $2\frac{1}{4}$ its length; head depth at occiput $1\frac{3}{5}$; dorsal base $1\frac{3}{4}$; least depth of caudal peduncle

3⅙; anal base 1⅘; pectoral (damaged) 2; ventral (damaged) 2⅘; snout 4; eye 3½; maxillary 1¼; interorbital 4.

Body elongate, slender, well compressed, profiles similar, apparently deepest at dorsal origin, edges rounded? Caudal peduncle compressed, its least depth about 3 in its length.

Head well compressed, profiles similar and slightly convex, flattened sides a little approximated below so that lower surface much narrower than upper and not keeled medianly. Snout conic, profiles convex, protruding, length about equals its basal width. Eye rather large, rounded, a little elevated, at first ⅖ in head. Adipose eyelid thin, covers eye entirely. Mouth large, front above with scarcely median depression. Maxillary straight, slightly expanded distally about 3⅓ in eye, reaches hind preopercle edge, though not quite to articulation of mandible. Maxillary teeth uniserial, close-set, anterior slightly

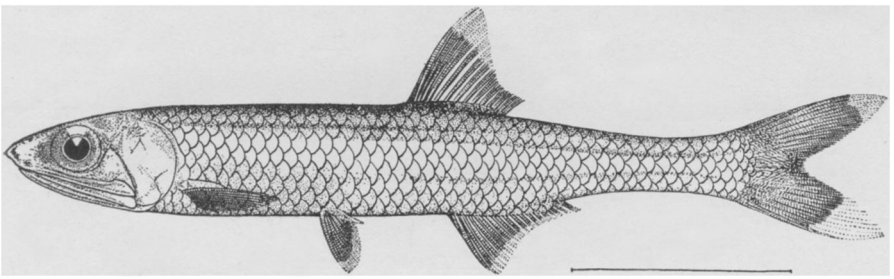

Fig. 2.—*Anchovia scitula* Fowler. Type.

bent back and posterior slightly inclined forward, throughout greater median extent of about uniform size, though anteriorly and posteriorly graduated down a little smaller, not continuous over front of upper jaw, and extending to hind end of bone. Similar more minute erect mandibular teeth, not connected across symphysis. Apparently no palatine or vomerine teeth, and pterygoids hardly roughened. Tongue smooth small knob, attached in front of mandible, from behind its upper surface and length of basibranchial shaft above a narrow area of minute asperities. Mandible convex over surface, constricted to point at symphysis, rami not elevated or only sloping gradually toward articulation behind. Mandible tip extends forward about opposite anterior nostril. Nostrils small, together, a trifle nearer eye than snout tip. Interorbital broadly convex. Each supraoccipital ridge distinct, flaring out a little over each eye anteriorly. Cheek would nearly form an equilateral triangle. Cheek and opercle smooth.

Gill-opening forward about opposite front eye edge. Rakers 19 +

26, slender, pointed, compressed, inner edges minutely denticulated, $1\frac{1}{5}$ in eye. Filaments 2 in eye. Pseudobranchiæ $2\frac{1}{2}$ in eye. Isthmus long, slender, narrowly compressed, and lower edge level, not trenchant. Branchiostegals 13, membranes united anteriorly only very short distance, forming narrow free fold over isthmus.

Scales caducous, or most all having fallen, according to pockets apparently narrowly imbricated, disposed in even longitudinal series, more or less uniform in size. Caudal base scaly, scales becoming small on bases of lobes, and inner bases of lobes each with an area of crowded elongated or horizontal scales. Dorsal and anal basal scaly sheaths? Long pointed distally free axillary pectoral scaly flap at least $\frac{3}{4}$ length of fin. Axillary ventral scaly flap ?

Dorsal origin midway between hind pupil edge and caudal base, graduated down from first branched ray (damaged) which apparently longest. Anal inserted about opposite middle of dorsal base or a little nearer pectoral origin than caudal base, anterior branched rays longest and others graduated down. Caudal forked, lobes (damaged) pointed and apparently equal. Pectoral small, low, and apparently (damaged) $1\frac{1}{2}$ to ventral. Latter inserted a little nearer anal origin than pectoral, and apparently (damaged) not quite half-way to anal. Vent close before anal.

Color in alcohol largely dull brownish on trunk, scarcely paler below. Head a little pale brownish above, sides and below silvery-white. Iris similar. A leaden-white band along side, from shoulder to caudal base, rather indistinct along costal region, above anal its width about $1\frac{1}{2}$ in eye and along side of caudal peduncle becoming still narrower. Fins all pale or dull brownish-white.

Length 4 inches (caudal tips damaged).

Type No. 1,576, A. N. S. P. San Diego, Cal. W. N. Lockington.

Only the above-described example known to me, and received many years ago. It appears to be related to *Anchovia exigua* (Jordan and Gilbert), but differs in a number of characters, such as the shorter maxillary, complete mandibular dentition, longer gill-rakers, slightly more posterior insertion of dorsal, more slender body and more pronounced silvery lateral band. *Anchovia miarcha* (Jordan and Gilbert), based on young examples, differs from *Anchovia scitula* in its fewer anal rays being 12 to 14, dorsal origin midway between snout and caudal, and no distinct lateral silvered band. It would hardly appear likely they are the young of the latter. *Anchovia starksi* (Gilbert and Pierson) differs in its more anterior dorsal origin, more posterior anal origin and longer maxillary.

(*Scitulus*, slender.)

Anchovia perthecata (Goode and Bean).

One example without locality.

Anchovia purpurea (Fowler).

(*Stolephorus purpureus* Fowler, Proc. Acad. Nat. Sci. Phila., 1900, p. 497, Pl. 19, fig. 1. Hawaiian Islands.)

Nos. 23,329 and 23,330, cotypes of *Stolephorus purpureus* Fowler. Also 16 examples from Hawaiian Islands.

Anchovia lepidentostole sp. nov. Fig. 3.

Head $4\frac{1}{4}$; depth 4; D. III, 12, I; A. III, 22, I; P. I, 12; V. I, 5; scales 35 in lateral series to caudal base and 3 more on latter; 9 scales obliquely forward from dorsal origin to that of ventral; predorsal scales 18; head width $1\frac{3}{4}$ its length; head depth at occiput $1\frac{1}{4}$; dorsal base $1\frac{1}{2}$; least depth caudal peduncle $2\frac{1}{5}$; pectoral $1\frac{3}{5}$; ventral 3; snout 5; eye $3\frac{1}{6}$; maxillary $1\frac{1}{4}$; mandible $1\frac{2}{7}$; interorbital $3\frac{1}{4}$.

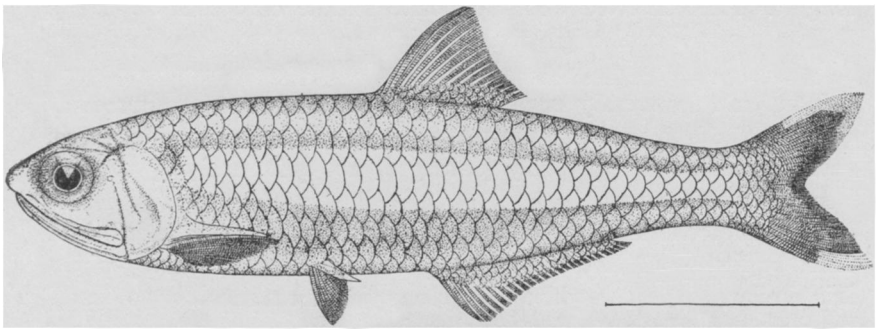

Fig. 3.—*Anchovia lepidentostole* Fowler. Type.

Body elongate, rather plump, compressed, fusiform or profiles rather evenly and similarly convex, greatest depth at dorsal origin, a slight dorsal and abdominal median keel and other edges convex. Caudal peduncle compressed, least depth $1\frac{1}{2}$ its length.

Head compressed, profiles slightly convex or similarly inclined, sides flattened and constricted well below so that lower surface formed much narrower than upper. Snout convex over surface and in profile, well protruded, length $\frac{3}{4}$ its basal width. Eye large, rounded, a little elevated, first third its length. Adipose eyelid covers eye, well developed. Mouth large, front above with scarcely median depression. Maxillary slightly curved, a little expanded distally till about $3\frac{1}{2}$ in eye, and not quite reaching preopercle ridge or mandibular articulation. Maxillary teeth fine, sharp-pointed, close-set, uniserial, all directed slightly forward, graduated down from front to end of bone, not continuous over front of upper jaw, and extending to hind end of

bone. Similar more erect and uniform mandibular teeth, not connected over symphysis. Apparently no vomerine, palatine or pterygoid teeth. Tongue small rounded smooth knob in mandible anteriorly. Upper surface of basibranchial shaft finely asperous. Mandible convex over surface, constricted to point at symphysis, rami not elevated inside mouth, sloping gradually toward articulation behind. Mandible included within upper jaw, so that snout protruded a little, and its tip extends little beyond anterior nostril. Nostrils small, together, a little nearer eye front than snout tip. Interorbital broadly convex. Each supraorbital ridge distinct, flaring slightly over each eye anteriorly. Cheek would form an equilateral triangle. Cheek and opercle smooth, except for a number of transverse mucous arborescent channels or tubes.

Gill-opening forward to front eye edge. Rakers about 18 + 25, slender, pointed, compressed, inner edges minutely denticulated, $1\frac{1}{3}$ in eye. Filaments $1\frac{4}{5}$ in eye. Pseudobranchiæ 3 in eye. Isthmus long, slender, narrowly compressed, lower edge level and not trenchant. Branchiostegals about 10, membranes apparently scarcely united anteriorly.

Scales largely adherent, narrowly imbricated, disposed in even longitudinal series, more or less uniform in size. Each scale with 2 to 4 vertical striæ, and about 3 anterior horizontal. Caudal base scaly, scales becoming small on bases of lobes, and inner bases of lobes each with an area of crowded elongated or horizontal scales. Dorsal and anal with basal scaly sheaths. Long pointed distally free axillary pectoral scaly flap but trifle less than fin in length. Similar axillary ventral scaly flap.

Dorsal origin midway between snout tip and caudal base, anterior rays elongate and graduated down from first branched. Anal origin about opposite first third in dorsal length, anterior rays elongate and graduated down from first branched rays, fin low posteriorly. Caudal emarginate (damaged), and lobes apparently pointed and equal. Pectoral $\frac{4}{5}$ to ventral. Ventral origin nearer that of anal than of pectoral, fin about half-way to anal. Vent close before anal.

Color in alcohol generally pale brownish, everywhere with traces of silvery sheen. Head largely silvery on sides and below. A broad silvery lateral band, about equals vertical eye-diameter, becomes a little constricted at shoulder and along caudal peduncle side. This well defined. Iris silvered white. Fins all pale brownish-white.

Length (caudal tips a little damaged) 4 inches.

Type No. 1,346, A. N. S. P. Surinam. Dr. Constantine J. Hering.

Also No. 1,347, A. N. S. P., paratype, same data. Head $3\frac{7}{8}$; depth 4; D. III, 12; A. III, 21, 1; scales 38 (largely according to pockets) + 3; 9 scales (pockets) between dorsal and anal origins; predorsal scales (pockets) 18; snout $4\frac{1}{2}$ in head; eye $3\frac{1}{8}$; maxillary $1\frac{1}{4}$; interorbital $3\frac{1}{3}$; length 3 inches.

This species appears related to *Anchovia brevirostris* (Günther) from Bahia, but seems to differ in the more numerous anal radii, that species having but 18. *Anchovia januarius* (Steindachner) is also a closely related species, but it differs as the origin of the dorsal is said to lie about an eye-diameter nearer the caudal base than the snout tip. In both of my examples it is about midway between the snout tip and the caudal base, and there is no trace of a dark gray cross-streak on latter.

(Λεπίς, scale; ἐντός, within; στολή, stole; with reference to the median lateral row of scales in the silvery lateral band.)

Anchovia brownii (Gmelin).

Ocean City 57, Corson's Inlet 5, N. J.; Ft. Macon, N. C. 1; Hailer's Rock 28, Marquesas Keys 25, Tortugas 2, Fla.; Santo Domingo 1; Mayaguez, Porto Rico 1; Rio Janeiro, Brazil 1.

Anchovia platyargyrea sp. nov. Fig. 4.

Head $3\frac{1}{4}$; depth $4\frac{2}{5}$; D. III, 12; A. III, 19, 1; P. 1, 12; V. 1, 6; scales about 35 (according to pockets) in lateral series to caudal base + 3 on latter; about 7 scales (pockets) between dorsal and ventral origins; about 15 predorsal scales (pockets); head width $2\frac{4}{5}$ its length; head depth $1\frac{3}{5}$; snout $4\frac{4}{5}$; eye $3\frac{4}{5}$; maxillary $1\frac{1}{8}$; interorbital 4; dorsal length $1\frac{3}{5}$; least depth caudal peduncle $3\frac{1}{2}$; caudal length $1\frac{2}{7}$; anal base $1\frac{3}{7}$; pectoral length 2; ventral 3; mandible $1\frac{2}{5}$.

Body well compressed, moderately long, profiles similarly and rather evenly convex, edges all rounded and predorsal scarcely trenchant, greatest depth about dorsal origin. Caudal peduncle well compressed, its least depth about $1\frac{1}{2}$ its length.

Head well compressed, profiles similarly inclined, though upper little more convex, flattened sides a little approximated below so that lower surface much narrower than upper and not keeled medianly. Snout conic, well protruding, basal width about equals its length. Eye rounded, rather high, a little before first third in head. Adipose eyelid well developed, covering eye entirely. Mouth large, front above with slight median depression. Maxillary straight, distally attenuated beyond mandibular articulation though not quite to gill-opening, its distal width $3\frac{1}{2}$ in eye. Maxillary teeth uniserial, close-set, fine, only

most anterior slightly bent back and greater extent posteriorly slightly bend forward, though still more anteriorly and posteriorly graduated down a little smaller, not continuous over front of upper jaw, and extending to distal end of bone. Similar more erect mandibular teeth, not connected across symphysis, more minute. A small asperous process each side of vomer, asperities very minute. Similar palatine and pterygoid asperities. Tongue smooth small knob, attached in front of mandible, from behind its upper surface and length of basibranchial shaft above minutely asperous in narrow area. Mandible convex over surface, constricted to point at symphysis, rami not elevated inside mouth or only gradually sloping to articulation behind. Mandible tip extends forward about midway in postnasal. Nostrils small, together, about last $\frac{2}{5}$ in snout. Interorbital broadly convex. Each supraorbital ridge distinct, flaring out a little over each eye anteriorly. Cheek would form an isosceles triangle, its base being nearly half its height. Cheek and opercle smooth.

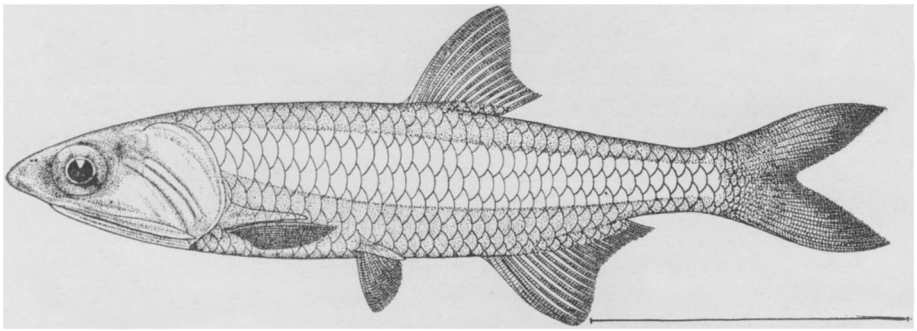

Fig 4.—*Anchovia platyargyrea* Fowler. Type.

Gill-opening forward till about opposite middle of eye. Rakers about 15 + 20, slender, pointed, compressed, inner edges minutely denticulated, $1\frac{1}{3}$ in eye. Filaments $1\frac{1}{3}$ in eye. Pseudobranchiæ 2 in eye. Isthmus long, slender, compressed, lower edge convex. Branchiostegals 12, membranes united anteriorly only very short distance, forming narrow free fold over isthmus.

Scales caducous, mostly fallen, narrowly imbricated, disposed in even longitudinal series, each with about 5 vertical striæ, and all of more or less uniform size. Dorsal and anal depressible within basal scaly sheaths somewhat. Caudal base scaly, inner edges of lobes each with an area of small crowded elongated or horizontal scales, and lobes basally with fine scales. Long pointed distally free axillary pectoral scaly flap $\frac{2}{3}$ length of fin. Similar axillary ventral scaly flap but little less than fin.

Dorsal origin midway between front pupil edge and caudal base, graduated down from first branched ray which is longest, and tips of anterior depressed rays extending but little behind last rays. Anal origin about opposite base of eleventh branched dorsal ray or a little nearer caudal base than pectoral origin, graduated down from first branched or longest ray. Caudal well forked, pointed lobes about equal. Pectoral about $\frac{4}{5}$ to ventral. Ventral inserted a trifle nearer pectoral origin than anal origin, and barely reaching half-way to latter. Vent close in front of anal.

Color in alcohol largely dull brownish, becoming paler about region of peritoneum. Head brownish above, sides and below, also iris, silver-white. A broad well-defined lateral silvery band, expanding to greatest width over anal where it equals $1\frac{1}{4}$ eye-diameters. Fins all pale brownish, dorsal and caudal minutely dotted with dusky.

Length 3 inches.

Type No. 1,416, A. N. S. P. St. Martin's, West Indies. Dr. R. E. Van Rijgersma.

Also Nos. 1,417 to 1,503, A. N. S. P., paratypes, same data. Ten of these examples, besides 9 from Fojardo, Porto Rico, identified by Evermann and Marsh[4] as *Anchovia chœrostoma* (Goode), show: Head $3\frac{1}{5}$ to $3\frac{1}{2}$; depth $4\frac{1}{2}$ to $5\frac{2}{5}$; D. usually III, 12, I, frequently III, 11, I; A. usually III, 18, I, often III, 17, I or III, 19, I, rarely III, 16, I or III, 20, I; scales in lateral series usually about 33 or 34, often 32 or 35, seldom 30, 31, 36 or 37 + 2 or 3; usually about 9 scales transversely between dorsal origin and ventral origin; usually 17 predorsal scales, frequently 16, often 15 or 18, seldom 14; snout 4 to $4\frac{2}{3}$ in head; eye $3\frac{7}{8}$ to $4\frac{1}{2}$; maxillary but little less than head; interorbital $3\frac{1}{8}$ to $4\frac{1}{8}$; length $1\frac{5}{8}$ to $2\frac{3}{4}$ inches.

From *Anchovia chœrostoma* (Goode) it differs in the maxillary not reaching the gill-opening, dorsal origin before depressed ventral tips, pectoral not reaching ventral and lateral silvery band wider than eye. *Anchovia argentivittata* (Regan) has fewer anal rays. *Anchovia astilbe* (Jordan and Rutter) is without a silvery lateral band. *Anchovia cubana* (Poey) has a longer maxillary.

(*Πλατύς*, broad; *αργυρος*, silver; with reference to the broad silvery lateral band.)

Anchovia commersonnii (Lacépède).

Padang, Sumatra 5, of which 2 are now in Stanford University.

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[4] Bull. U. S. F. Com., 1900, p. 88.

Anchovia delicatissima (Girard).

San Diego, Cal. 15.

Anchovia eurystole (Swain and Meek).

Dr. R. J. Phillips secured a single example at Corson's Inlet, N. J., on October 24, 1909, which is now in the collection. This is the first specimen I have examined.

Anchovia cayorum (Fowler).

(*Anchovia chærostoma cayorum* Fowler, Proc. Acad. Nat. Sci. Phila., 1906, p. 85, fig. 4. Hailer's Rock, Fla. Keys.)

No. 30,613, A. N. S. P., type of *A. chærostoma cayorum* Fowler. Also 17 others with same data.

Anchovia mitchilli (Valenciennes).

Wood's Hole, Mass. 2; Seaside Park 3, Beesley's Point 3, Corson's Inlet 12, N. J.; Fort Delaware, Del. 32; Tolchester Beach, Md. 1.

Goode's figure of *Engraulis vittatus*,[5] which has been allowed to represent this species, differs at once in having 13 scales transversely.

Anchovia compressa (Girard).

San Diego, Cal. 1.

Anchovia tapirula (Cope).

(*Engraulis tapirulus* Cope, Proc. Amer. Philos. Soc, XVIII, 1877, p. 45. Probably Pecasmayo Bay, Peru.)

No. 21,851, A. N. S. P., type of *E. tapirulus* Cope.

Anchovia duodecim (Cope).

(*Engraulis duodecim* Cope, Trans. Am. Philos. Soc. (2) XIII, 1869, p. 405. Beesley's Point, N. J.)

No. 1,363, A. N. S. P., type of *E. duodecim* Cope.

Anchovia encrasicholoides (Bleeker).

Padang, Sumatra 4.

Anchovia nasus (Kner and Steindachner).

Probably Pecasmayo Bay, Peru 1.

Engraulis encrasicolus (Linnæus).

Italy 5 (in Bonaparte Coll.); no data 1 (Cope).

Engraulis mordax Girard.

Santa Barbara 4, Point Lobos 1, Point Reyes 1, San Diego 1, Cal.; no data 5, probably Cal. ?

Engraulis ringens Jenyns.

Probably Pecasmayo Bay, Peru 1

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[5] *Nat. Hist. Aquat. An. U. S. Com. Fish and Fisheries*, 1884, Pl. 218. Noank, Conn.

Cetengraulis edentulus (Cuvier).

Rio Janeiro, Brazil 1.

Cetengraulis engymen (Gilbert and Pierson).

Panama (J. A. McNiel) 15.

Thryssa valenciennesi (Bleeker).

Padang, Sumatra 2, of which 1 now in Stanford University.

Pterengraulis atherinoides (Linnæus).

Surinam 1.

Telara telara (Hamilton-Buchanan).

Ganges R., India 1.

Lycengraulis grossidens (Agassiz).

Surinam 1.

GONORHYNCHIDÆ.

Gonorhynchus gonorhynchus (Linnæus).

Melbourne, Australia 4.

OSTEOGLOSSIDÆ.

Osteoglossum bicirrhosum Agassiz.

Manacapuru, Brazil 1; between Rio Negro mouth and Peru 1; Peruvian Amazon 1; Ambyiacu R. 2.

Scleropages guntheri (Castelnau).

Thirteen examples from "New Zealand" received from Dr. J. Haast. These examples differ from the account and figure of *Scleropages leichardti* Günther,[6] chiefly in the shorter maxillary, longer eye and longer pectoral, all points in harmony with *Osteoglossum guntheri* Castelnau,[7] a species which is not noticed by Saville-Kent. The latter apparently wrongly identifies *Scleropages leichardti*, as a glance at his distinctions for that species as compared with his *Osteoglossum jardinii*,[8] will show. Thus it appears *Osteoglossum leichardti* Saville-Kent is not of Günther, but really identical with *Scleropages guntheri* (Castelnau), and *Osteoglossum jardinii* Saville-Kent is identical with *Scleropages leichardti* Günther. It may be doubtful that my examples were indigenous to New Zealand, though they were all labeled with that locality. Their identity with Castelnau's species

[6] *Ann. Mag. Nat. Hist.*, (3) XIV, 1864, p. 196, Pl. 7. Burdekin River, Queensland.

[7] *Journ. de Zool. Gervais*, V, 1876, p. 131. Northeast Australia.

[8] *Proc. Roy. Soc. Queensland*, VIII, pt. 2, 1890–91, p. 105. Northern Queensland.

is in every way established. They show the following variations in some of the principal characters.

Head $3\frac{7}{8}$ to $4\frac{2}{5}$; depth $3\frac{7}{8}$ to $4\frac{3}{7}$; D. usually 18, often 17, rarely 16 or 19; A. usually 29, often 28, seldom 27; scales in l. l. usually 32, seldom 30, 31, 33 or 34 + usually 4, often 3; usually 4 scales above l. l., sometimes 5; usually 5 scales below l. l., frequently 4, rarely 6; predorsal scales usually 23 or 24, sometimes 21, 25 or 26; snout $4\frac{1}{4}$ to 5 in head, measured from snout tip to hind bony opercle edge; eye $5\frac{1}{5}$ to $6\frac{1}{5}$; maxillary $1\frac{3}{4}$ to $1\frac{7}{8}$; interorbital $3\frac{2}{5}$ to $3\frac{7}{8}$; length $11\frac{1}{2}$ to $23\frac{1}{4}$ inches.